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APPROVAL OF UNDP ASSISTANCE TO A PROJECT OF BRAZIL

IPF:(1992-96) $ 14 183 000
(BRA/92/G31) - Biomass Integrated Classification/Gas Turbine

Date of approval by the AC:[1/]	2 September 1992
Expected duration:	28 months
Proposed executing agency:	Government (Secretariat for Science and Technology)
Government implementing agency:	Consortium of public and private sector organizations
Proposed UNDP contribution:	$ 6 7[illegible]00 Source of funds: GEF
Total UNDP budget:	$ 6 796 300

Project background

Biomass Integrated Gasification/Gas Turbine (BIG/GT) is one of the best examples of a technology with the potential to make a significant impact on the growth of CO2 concentrations in the atmosphere and which coulc become cost-competitive with conventional fossil fuel-based electricity in the coming years.

The use of biomass to generate electricity is roughly neutral in its release of CO2 over the whole biomass growth and burning cycle. Growing trees act as a carbon sink, absorbing carbon from the atmosphere. When this biomass is later burned, the stored carbon is released but the overall contribution to the greenhouse effect is zero since there is no net addition of carbon to the atmosphere, provided the biomass is allowed to re-establish itself. The production of electricity from biomass through conventional steam cycle power generation is both inefficient and expensive. BIG/GT technology has the potential to overcome these advantages over the scale of 15-100 MW indicating that it can become cost-competitive with fossil-fuel generation at today's energy prices. As well as the marginal costs of incremental hydroelectric capacity rise as low cost resources become fully utilized, BIG/GT is now seen as the leading least-cost alternative.

Provided a sufficiently favourable combination of reliability, efficiency and specific investment cost can be achieved, BIG/GT technology can create a commercial linkage between energy markets, reforestation and the concentration of CO2 in the atmosphere. However, without external support, private sector industry cannot pursue technology development due to the commercial risks involved.

Research on BIG/GT technology was initiated in 1986 and has involved Princeton University's Center for Energy and Environmental Studies, SHELL, General Electric, Studsvik (Sweden) and VTT (Finland) among others. In Brazil, Cia. Hydro-Electrica de Sao Francisco

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[1/] **This Fact Sheet reflects the status of the project/revision at the time it was approved by the Action Committee; modifications to the project/revision may have occurred subsequently.**

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(CHESF) has been investigating Big/GT viability for more than seven years. In the second quarter of 1991, CHESF, together with SHELL, initiated discussions regarding a joint effort to demonstrate BIG/GT technology in Brazil, using wood and bagasse as the principal energy sources. These negotiations culminated in the public announcement of a commitment by the Secretariat for Science and Technology to support such a project in Brazil and initiation of a study by a private - public sector consortium to establish the technical basis for a funding proposal to GEF for the development of the technology. This proposal was subsequently presented and approved by the Participants of the GEF in December 1991.

Description of project

The entire project will comprise of five phases, with funding denoted here for PHASE II only. The main objective of this project as a whole, is to demonstrate the commercial feasibility of using biomass as a feedstock for power generation through the use of BIG/GT technology, its suitability for applications in developing countries, and the possibilities it offers for commercial activity in regions with low economic potential. Commercial feasibility will be achieved with the satisfactory demonstration of: (i) the technical feasibility of producing the required amount of low heat gas from wood, with the necessary quantity to be burned in a GT; (ii) the capability of the BIG/GT technology to produce electricity with the necessary reliability; and (iii) the economic feasibility of the whole production cycle from the forestry phase to the end of the conversion process.

PHASE I consisted of a preinvestment study which (1) explored BIG/GT technology options and identified and shortlisted equipment manufacturers; (2) outlined a work programme for equipment development during PHASE II and proposed budget allocations; and (3) provided a basis for assessing the commercial and technical potential of BIG/GT and for the allocation of project funding.

PHASE II will resolve important engineering, business, economic and financial aspects of the technology's development through the extension of subcontracts on a competitive basis to the leading organizations in this field. The engineering component will include the adaptation of new gas turbines for electricity generation to biomass gas of low caloric content, as well as determination of optimal gasifier design and operational parameters. This phase ill result in the preparation of the conceptual engineering design including comprehensive technical specifications. Phase II will include selection, in the Northeast of Brazil, of the site of the expected demonstration plant involving an environmental impact assessment of all aspects of the production cycle, with special emphasis on identifying sustainable biomass production and harvest systems. As well, this Phase will determine potential socio-economic impacts of the electricity generation cycle on local landholders and communities.

With commercial feasibility clearly demonstrated as a result of this phase, Phase III will comprise the construction of the BIG/GT demonstration plant to be partially funded under a (US)$23 million grant from the GEF, as earmarked by the Implementation Committee in September 1991. PHASE IV will comprise the operational demonstration of the plant under zero commercial constraints with the aim of confirming its main design parameters and completely debugging it; and PHASE V will consist of the plant's operation under normal commercial conditions.

Inputs

UNDP will provide 28 man-months of national professional personnel totalling (US)$200,000; sub-contracts for biomass integration; 27 man-months of international professional personnel totalling (US)$270,000; equipment for gas turbines and miscellaneous costs.

Financial data

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Personnel	686 200
Subcontract	5 850 000
Equipment	30 000
Miscellaneous	230 100
Total	6 796 300